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Culling for Egg Production

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Culling for Egg Production

G. O. Hall and D. R. Marble

Culling and selection are two terms often used in reference to separating laying birds into satisfactory and unsatisfactory groups.

Culling refers to the practice of removing the undesirable birds from a flock, whether that flock is made up of pullets ready to lay or of yearling hens completing their year of production. *Selection* is picking individual birds for breeding purposes. It applies to both males and females of all ages. In addition to the characters used in culling, several others are important in the selection of breeders. Discussion in this bulletin is, however, confined only to those characters that directly apply to culling.

The periodic culling of laying flocks needs no justification. Thousands of New York farm flock owners as well as commercial poultrymen have proved to themselves the economic importance of culling, yet culling is not practiced so much as its economic advantages would justify. The poultry producer can benefit financially in three ways from culling. He can:

1. Lower his feed bill.
2. Through earlier marketing, receive higher price per pound on birds culled.
3. Get higher production from the remainder of the flock because they have more room in the laying house.

When to Cull

The removal of all sick and diseased birds should be a continuous process throughout the entire year. This culling should not be restricted to once a month or even once a week. The caretaker should be constantly on the alert for birds that show symptoms of poor health. He should keep a catching hook near each pen so he may remove such birds immediately.

Weekly culling from the floor keeps the number of unhealthy birds to a minimum and often is a regular procedure even when daily removal is practiced. Heavy culling on a weekly or even monthly basis should not be necessary during the first eight to nine months of the laying year when a spring brooding program is followed. If egg production slumps badly during the early part of the laying year, it is advisable to search for the cause and to remedy it rather than to cull heavily.

In late spring or early summer, birds begin to go out of produc-

tion and to start the annual molt. At this time, periodic culling is begun. How often to cull depends on market outlets and on the extent to which birds are going out of production.

Handling the Birds

MANY poultry producers have not culled regularly because of the difficulty of handling the entire flock. It is not necessary to handle each bird when the only object is to remove birds that have ceased production. The simplest procedure is to go along the roosts at night with a good flashlight and very quietly remove any birds that show evidence of being out of production or in poor health. Such birds can be crated and then checked the next morning for final decision.

Leghorns and other large-combed breeds can be more easily culled by this method than can the heavy breeds which have much smaller combs. Many strains of New Hampshires now have much larger combs and are not difficult to cull by flashlight.

Most poultry producers who follow this culling system find the job much easier if dropping pits are used than when the roosts are over dropping boards, because the birds will be much closer to the floor.

When one handles the entire pen of birds, it is best to make a small enclosure in one corner of the pen with a section of woven-wire fence, or two gates, each about 10 feet long and from 5 to 6 feet high (figure 1). Catching crates help in handling entire flocks, but unless several crates are available to place end to end their use slows the job. Hooks or nets can be used to catch the stragglers, but their use for an entire flock is objectionable. The damage to future production is directly proportional to the disturbance made in culling the flock.

Previous Flock History

WHEN one is culling his own flock, the past history and present performance of the flock would not be a problem. In culling flocks on other farms, however, it is always desirable to learn as much as possible about the flock. Some good hens may be out of production if environmental conditions are not right. When the entire flock has been out of production for several weeks, it is difficult to cull satisfactorily.

What to Look For

TO do a thorough job of culling, one should be able to interpret accurately: (1) the present laying condition and (2) approximately how long each bird has been in or out of production. The characters that tell time in terms of weeks or months are more difficult to evaluate than are those that determine present laying condition. Birds frequently go out of production for short periods and then return to

Figure 1. A section of stiff woven wire is excellent for catching birds when the entire flock is to be handled.

production, and these rests are confusing when one attempts to determine past performance.

Present Laying Condition

Comb and wattles

The comb and wattles reflect quite accurately the changes that take place in the ovary. When egg yolks begin to develop, the comb and wattles expand greatly in size and take on a waxy and bright red appearance. Likewise, when ovarian activity within the body ceases, the comb and wattles decrease in size and become shriveled, dry, and pale in color.

In laying flocks, this shriveled and dry appearance of the comb is very noticeable and should provide enough evidence to crate a bird when culling at night by use of a flashlight. With the heavy breeds, one must observe the birds more closely to find all that show comb shrinkage.

Abdominal region

For flashlight culling, there is no need to look beyond the head changes. For more detailed examination, the abdominal region of the body adds to the story. The vent of the laying hen is large, moist, and dilated and tends to become crescent shaped in birds that have been

Figure 2. Bird in heavy laying condition. The skin is soft and the abdomen pliable; the vent is large, moist, and full; and the pelvic arch is widespread.

Figure 3. Bird in dormant condition. The body is full, hard, and plump; the vent is small and puckered; distance between the blunt pubic bones is short.

laying for a long time. Contrasted with this is the small, dry, contracted vent of a hen out of production.

The pubic bones on either side of the vent are wide apart (2 to 3 fingers approximately) in a hen that is laying heavily. Continuous, heavy production tends to remove the hard fat from the pubic bones, leaving them pliable.

Also, the space between the rear end of the keel bone and the pubic bones increases as a bird begins to

Summary of Characters Describing Present Laying Condition

Character	Laying	Not Laying
Comb and wattles	Soft and waxy; much enlarged, bright red color	Dry and rough; shrunken; pale or grayish in color
Vent	Large, moist, dilated	Small, dry, contracted
Pubic bones	Spread apart; feel thin and pliable after several weeks of production	Close together; feel thick due to hard fat
Abdomen	Much enlarged; soft and pliable	Very contracted; often hard and fat
Skin	Soft, pliable, and loose	Rough and tight to body

lay heavily or decrease, as she ceases production. In a laying hen, the abdomen is very soft and pliable; but, after a bird has been out of production several weeks, the abdomen becomes heavily covered with fat, resulting in a hard, rubbery condition (figures 2 and 3).

Length of Laying Period

The culler has two useful guides to help him determine how long a hen has been in or out of production. These are *pigmentation* and plumage changes, or *molt. Pigmentation* refers to the yellow color deposited in the tissues of yellow-skinned varieties, and is evident in all visible parts of a healthy pullet before production has commenced and in cockerels at all times. Pigmentation can be used most effectively as a guide during winter, spring, and early summer, but is less effective in fall culling because so many of the birds become entirely bleached by that time. *Molt,* on the other hand, is of little value except during the fall molting season. These two characters, however, dovetail together so effectively that for the most accurate interpretation of past production both should be considered.

Pigmentation

The yellow pigment (xanthophyll) laid down in the fat of the skin and underneath the skin gives the deep yellow pigmentation of the mature pullet. The main sources of this xanthophyll pigment are yellow corn and green grasses and, as a result, the supply of these feeds determines the intensity of pigment carried by different birds or flocks. When a bird starts to form egg yolks preparatory to laying, much of the pigment coming into the body through the feed goes directly to the ovary. This limits the amount available for deposition underneath the skin. The pigment already present in the layer of fat beneath the skin is gradually lost by oxidation through the outer layers of skin or possibly by being reabsorbed into the blood for use in yolk formation. This results in a gradual bleaching of the visible parts of the body.

Order of bleaching

Bleaching starts in all parts of the body at the same time, but the rate of bleaching varies widely in different parts of the body. This results in a definite order of bleaching which is the same in all laying birds. The order in which the various sections become completely bleached is closely associated with the types of tissue and the extent of blood circulation in these various parts of the body. The softer tissues bleach more rapidly than do the harder tissues. Studies many years ago at Cornell showed that both the order of complete bleaching and production (the average number of eggs laid) are associated with different degrees of bleaching:

Order of bleach	Number of eggs needed to bleach part	Time to bleach (after first egg is laid)
1. Vent	0 to 10 eggs	0 to 2 weeks
2. Eyering and earlobes	10 to 15 eggs	2 to 3 weeks
3. Beak	35 eggs	6 to 8 weeks
4. Shanks		
Bottom of feet	68 eggs	3 to 4 months
Front of shanks	96 eggs	4 to 6 months
Entire shank	175 eggs	6 to 8 months

Egg yolks begin to develop from 7 to 10 days before the first egg is laid. Consequently, bleaching of the vent is often very apparent by the time the first egg is laid.

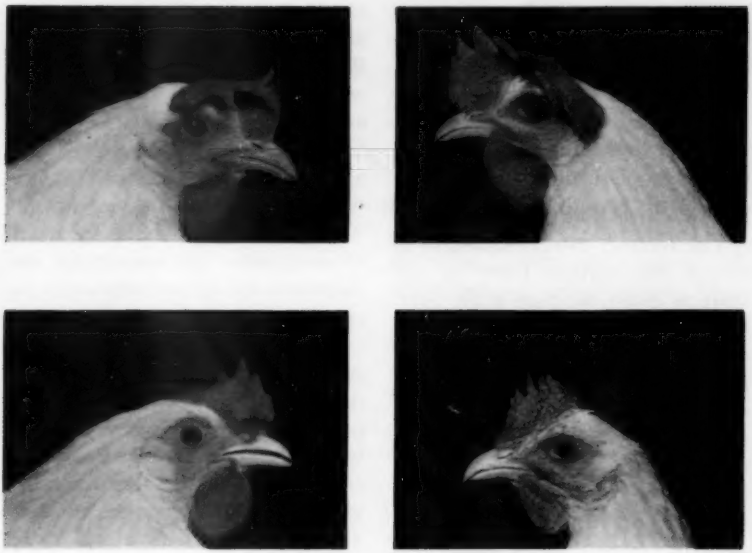
Few persons use pigmentation of the eyering and earlobe as a basis for culling because the beak pigmentation is easier to observe and probably more accurate.

Bleaching of the beak is progressive from the base (part attached to head) towards the tip of the beak. The color plate on page 9 shows several stages of beak bleaching and repigmentation. A beak bleached about half-way from the base towards the tip is indicative of a production of from 15 to 20 eggs. The lower mandible of the beak fades more rapidly than the upper mandible and, as a result, there is often a trace of yellow pigment on the curved tip of the upper mandible, but none on the lower. Rhode Island Reds and New Hampshires often show a reddish horn color on the beak which does not fade. In these breeds the yellow pigment is visible on the inside edges of the mandibles.

The shanks, because the color changes are very slow, are valuable indicators of long periods of production. First evidence of bleaching in the shank appears on the bottoms of the feet. The fronts of the shanks bleach more rapidly than do the backs of the shanks, especially the hock joint where the feathers extend down over the scales of the shank. Pigment is also slow in bleaching from the heavy, coarse scales on the top of the joint at the attachment of the foot to the shank.

Return of yellow pigment

When the ovary ceases to develop new yolks and production stops, the fat globules which were going into the formation of the yolks are again available for deposition in the tissues of the bird. As this deposition of fat takes place, a yellowish cast is again apparent. The order of renewal of pigment is about the same as the order of bleaching,



Pigment Changes

Top left: This pullet is well pigmented. She has not started to lay.

Top right: The beak of this bird is one-half bleached after three to four weeks' production.

Lower left: The beak of this bird is completely bleached after six to eight weeks' production.

Lower right: This bird has stopped laying and the pigment is returning.

but the return is much more rapid. From 3 to 4 weeks of non-production will repigment the beak, and from 2 to 3 months will renew the yellow color of the shanks, provided the diet carries an ample supply of the xanthophyll pigment.

Rate of bleaching

The number of eggs necessary to bleach the various parts of the body as given on page 8 are average figures. These changes vary in different birds, depending upon the intensity of the original pigment, the pigment content of the ration, the size and vitality of the bird, and the coarseness of the skin. Some birds come into production with very light pigmentation and, consequently, bleaching is completed much more rapidly than for the average bird. Other birds have deep pigmentation when they begin to lay and will not be fully bleached by the production of the number of eggs indicated for the average bird.

Since yellow corn and green grasses contain the xanthophyll pigment, variation in the amount of these ingredients in the ration affects the rate, but not the order, of bleaching. The amount of original pigment also varies, depending upon the ration. Increases in the amount of yellow corn fed or allowing birds access to good range may cause the return of a light yellow cast to the visible parts of the body even though the birds have been in continuous production.

Usually, large birds bleach more slowly than do small birds. General-purpose breeds, such as Plymouth Rocks or New Hampshires, bleach more slowly than Leghorns, and even within the breed a large Leghorn may bleach more slowly than a small Leghorn. The same thing is true for coarse, thick-skinned birds. The coarse-skinned birds are likely to carry more fat underneath the skin and are frequently larger in size.

Pullets, even though grown on good grass range, may come into the laying house with little pigment evident if they have a heavy worm infestation or chronic coccidiosis. Any disease that interferes with normal feed consumption or assimilation of the nutrients of the feed affects the rate of bleaching or repigmentation as well as the intensity of original pigment.

White-skinned breeds

Most commercial breeds used for egg production are yellow in skin color, but some growers have flocks of Minorcas or Orpingtons whose skin color is white. Consequently, in culling these breeds one must rely entirely upon laying condition and plumage changes rather than on pigmentation.

Plumage Changes, or Molt

It is normal for all domesticated birds, regardless of sex, to shed the old, worn plumage and grow new plumage each year. The wing is divided into two sections separated by a small feather called the *axial*

feather. As the wing is spread out from the body, the section nearest the body is called the *secondary wing section,* and the part further away from the body is called the *primary section.* In examining hens for evidence that will help in culling the less productive birds, one checks the primary wing section for most of this evidence. Before culling, one must understand the order of molt, especially in the primary wing section.

The order of molt of the different feather sections is regular not only between the two wings but between different birds in the flock. The various parts of the body plumage begin to drop in the following order: first the head, followed by the neck and, lastly, the body itself. Feathers in the tracts on the breast, thighs, and back drop at about the same time. Feathers in the wings and tail begin to drop at about the same time as the body feathers, but the body plumage will be completely grown out several weeks before the wing feathers are fully molted. There may be a small amount of molt on the head and neck during the winter and spring months, but there is little molt elsewhere without seriously affecting the production of the bird.

The order of molt in the wing is also regular. In the primary section of the wing, the feather next to the axial feather drops out first and the remaining nine primaries drop in regular order; the outermost primary feather is the last to drop in a normal, complete molt in this section.

In the secondary wing feathers, or the section nearest the body, the order is less regular, yet it is consistently the same in all birds. There are from 12 to 14 secondary feathers although those next to the body taper in size. Counting from the axial feather, the tenth to the fourteenth feathers drop first. Then the molt begins with the second secondary feather and works toward the body in regular order. Following the ninth feather, the first secondary and axial feather are dropped.

The relationship between molt and past egg production is not nearly so close as in pigmentation. Nevertheless, the nature of the molt in high-producing hens differs in several respects from that found in low-producing hens. The major differences are shown in the summary on page 15.

Time of molt

Usually birds that molt at the end of 8 to 10 months of production are considered early molters. Such birds have completed their molt ahead of the late molters, but the number in a flock is not enough to justify special management and, consequently, these early molters are out of production much longer than are the late molters. To be profitable, a flock must maintain a high level of egg production during the months of highest egg prices, and only the late fall molters will

remain in production during those months. Early molters should be culled as rapidly as they show evidence of molt and cessation of production.

The preceding discussion applies to birds hatched during the normal late winter and spring months. Today more chicks are being hatched in October, November, and December and the pullets from those hatches mature in the spring. The molt of such birds is usually very late in the fall, and possibly some of the birds may lay through the fall and winter months without any molt.

Laying and molting at the same time

A bird to combine molting and laying must utilize her feed efficiently, for the growth of a new coat of feathers requires a large amount of feed. Poor producers lack the physical makeup to use feed efficiently and few poor egg producers combine molt and production even for a few days. To both produce and molt, a bird must be in excellent physical condition, either gaining in body weight or holding a steady weight. Most birds that combine these two functions limit their molt to the primary feathers and a light body molt. Whenever the molt is extended to the secondary section of the wing and the tail feathers, the drain on the system for feather replacement is so great that the bird is forced out of production.

Rapidity of molt

Birds bred for high egg production can shorten the molt period in several ways. One way is to drop successive primary and secondary feathers closer together. Another common practice is to drop several primaries at the same time. A third way is to return into production before fully completing the molt. Apparently the molting hen is not able to gain time by growing her individual feathers in a shorter period of time. A single primary feather requires at least six weeks for complete growth. Research has shown that this rate of feather growth is the same for both good and poor producers.

Detailed weekly studies of the length of each primary feather show that good producers actually drop their primary feathers closer together than do poor producers. Good producers drop their primary feathers at about one-week intervals, whereas poor producers take about two weeks between the dropping of successive primary feathers. The time between the dropping of successive primaries is not difficult to determine since the bird dropping a primary every week will show several more partially grown feathers in her wing than will the bird dropping a feather every two weeks. The wings of birds dropping primaries every week and every two weeks are shown in figures 4 and 5.

Birds that drop almost all their body plumage at one time are

Figure 4. This is the wing of a fairly rapid molter. She is dropping primary feathers at intervals of one week or less.

Figure 5. The wing of a relatively slow molting hen. She is dropping primary feathers about two weeks apart.

Figure 6. This hen dropped more than one primary feather at a time. Note that the two growing primaries are the same length.

Figure 7. This hen failed to complete the primary feather molt before coming into production as a pullet. Note the three narrow, pointed chick feathers at the right.

usually excellent egg producers. In contrast, the poor egg producers usually molt their body feathers so slowly that one would not know any feathers were being renewed unless the plumage was examined closely. A measure of rapidity of molt can be obtained only while the bird is in the middle of her molt.

Dropping more than one primary at a time

It is not unusual for good egg producers to drop several primary

feathers at one time. Two, three, or even five primaries are often observed to be the same length when partially grown in (figure 6). When several primary feathers drop at the same time, the time before more feathers are dropped is naturally lengthened but the total time lost due to molt is shortened in those birds that drop several at a time. Poor producers seldom drop more than one primary feather at a time.

Completion of molt

Examination of most flocks of birds shows that some birds do not fully complete their juvenile molt prior to the onset of egg production. The typical tapering and sharply pointed chick feathers on the outer edge of the primaries are shown in figure 7. About twenty years ago the junior author examined several groups of White Leghorn pullets at the age of eight months. About half of those birds showed from one to three chick feathers carried over, indicating that the urge to start production was greater than the urge to complete the juvenile plumage. Age at sexual maturity showed a definite relationship between the number of chick feathers carried over and sexual maturity. Birds showing one chick feather matured about two weeks earlier than birds showing no chick feathers carried over. Birds showing two chick feathers matured about one week earlier than those showing one chick feather. Only three birds were observed to retain three chick feathers, but those birds averaged to mature in 143 days as compared with 175 days for the group completing their juvenile molt.

This same condition frequently is observed in yearling or older birds. Three-year-old birds have been observed still carrying chick feathers, indicating that those birds never had completed their molt before starting to lay again.

The extent of the molt in the primary section can be determined months after the bird has returned to egg production by the presence or absence of a shorter primary feather. This is equally true of a vacation molt sometime during the laying year. The shorter feather which is the key to how far the molt had progressed before egg production started again is shown in figure 8.

Figure 8. This hen had a vacation molt. Note that the seventh primary is shorter than the eighth, making a slight break between the two.

Summary of Molt Characters

Character	Good Birds	Poor Birds
Time of molt	Late fall; often necessary to force birds to molt	Early summer; difficult to hold in production
Laying and molting at same time	Frequently, as long as birds are gaining in weight or holding weight	Seldom; production usually ceases prior to onset of molt
Rapidity of molt	Drop body feathers at one time; drop primaries close together—about one primary each week	Seldom show heavy pinfeather condition; drop a primary feather every two weeks
Dropping more than one primary at a time	Frequently drop from 2 to 5 primaries at same time	Seldom drop more than one primary at a time
Completion of molt	Often do not complete molt; may carry over one to several primaries	Usually complete molt and often repeat on some feathers

Partial or vacation molts are frequently confusing because the time of the molt determines whether the bird will, at a later date, start where she left off on the vacation molt or whether she will start at the No. 1 primary feather and molt in regular order. If the partial molt takes place in fall or early winter, the bird will again start with the first primary and drop the feathers in regular order. If, however, the partial molt is in early summer and the bird returns to egg production, she will start her regular fall molt where she left off with her previous vacation molt and complete the molt in regular order. She may repeat on those feathers dropped during the vacation period, but not until after she has completed the molt on the section of the wing not previously dropped.

Head and Body Type

In routine culling of the laying flock, there is little need to consider either head or body type. These characters are important in the selection of both males and females for breeding flocks, but neither head type nor body type needs to be considered in ordinary culling of the laying flock except as size and condition of the comb or abdominal measurements may reflect laying condition.

Culling Pullets

IT IS as important to cull the pullet flock as to cull the laying flock. Many poultrymen, however, do not cull the pullet flock closely for several reasons. On many farms the pullets are moved from the brooder house or range shelter to the laying house after dark. This offers little opportunity to cull at the time of housing and, unless the birds are handled at a later date for blood testing, about the only culling of pullets that can be done is with a catching hook during daytime.

Another reason why many flock owners cull so few pullets is the lack of confidence in their ability to do a good job. There is always the tendency to put all the pullets in the house and to see how they develop. This is particularly true when the supply of pullets is not in excess of the number of birds that can be housed.

On large commercial farms, and especially where the flocks are mated for hatching eggs, a better job of culling pullets is practiced. The severity of culling on these farms varies widely, depending on the surplus of pullets and the use to be made of the eggs produced by the flock. The discussion in this bulletin is confined to those flocks used only for market-egg production.

In culling pullets, the primary objective is to detect and market immediately those birds which, because of health or other reason, could not make a profit in the laying house. Pullets with crooked beaks or backs, which would prevent the birds from getting an abundance of feed, should be discarded. Birds with very small bodies for the strain and breed ought to be culled because they normally would not be able to produce large-sized eggs in large numbers.

All pullets that show signs of disease or lack of good health should be culled at housing time. This includes birds that show definite breaks in the outline of the pupil of the eye due to leucosis or range paralysis. It includes also birds that are extremely thin, emaciated, or lacking in normal yellow pigment due to serious outbreaks of coccidiosis or worm infestation. Unhealthy pullets can never be relied upon to make a profit.

Extremely late-maturing pullets should be culled when possible. Sometimes, because of a shortage of pullets, poultrymen save their late-maturing birds. If this is necessary, it is best to place the late-maturing birds into another pen so they can be managed differently from the rest of the flock.

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